

This is the first study to report the existence of an inverted U-shaped association between subjective well-being and sleep duration when analysis was performed without adjusting for covariates. It also demonstrated a linear association after adjusting for covariates.

Among the various factors associated with the PGC Morale Scale scores used in this study, psychological stress and physical pain contributed to the deterioration in subjective well-being (lower adjusted odds ratios). As it was inferred that these two factors were associated, in particular, with deterioration of subjective well-being among the elderly, they were included as variables for adjustment. Many studies have examined associations between sleep and psychological stress and physical pain [1,23]. It was suggested that although the influence of physical pain was not as strong as that of psychological stress, if the subject suffered from EMA and SEMU, physical pain influenced the deterioration in subjective well-being of those whose sleep duration was <6 h. A previous study has reported an association between depression and sleep disturbance caused by pain [6]. This may be related to the above-mentioned association between physical pain and subjective well-being.

This study had some limitations. First, since it was a cross-sectional study, a causal relationship could not be established between subjective well-being and sleep. However, this study utilized the results of the third survey that was part of the longitudinal study, and a follow-up study is planned. Second, no objective methods (physiological methods such as polysomnography) were employed to investigate sleep disorders. However, in a large-scale random-sampling survey, it is almost impossible to employ a physiological method. We expect further developments in the establishment of objective methods, including physiological methods, which will improve the reliability of such studies.

Third, the response rate of participants who answered all items of the PGC Morale Scale was low. Hence, there may have been a non-responder bias.

We expect that the results of this study will contribute to improving the subjective well-being of the elderly and understanding the characteristics of sleep disorders, since it demonstrates the associations between subjective well-being and subjective sleep sufficiency and appropriate sleep duration.

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